A59 Reciprocating Saws as Tools of Dismemberment

Jacqueline M. Berger, Boston University School of Medicine, 90 Saint Mary's Street, BN #7, Boston, MA 02215; James Pokines, PhD, Boston University School of Medicine, Dept of Anatomy & Neurobiology, 72 E Concord Street, L1004, Boston, MA 02118; and Tara L. Moore, PhD, 700 Albany Street, W701, Boston, MA 02118*

After attending this presentation, attendees will be familiar with class characteristics of sharp force trauma caused by reciprocating saws, specifically those characteristics most affected by variations in blade type. The results of qualitative analysis of sharp force trauma inflicted by a reciprocating saw with interchangeable blades will be presented.

This presentation will impact the forensic science community by demonstrating the effects of reciprocating saws, which may be used in cases of dismemberment. This presentation will add to previous research by broadening the understanding of a different type of mechanical saw and its effects on bone.

The analysis of sharp force trauma characteristics to bone is undertaken to determine the class of implement used to inflict the trauma. Specific features of kerfs vary based upon saw blade properties, including the morphology of the blade teeth, how the saw is powered, and how it is wielded in reference to the bone. The present study focuses on the characteristics created by reciprocating saws, which previously have not been investigated in detail. The hypothesis tested is that reciprocating saws have unique class characteristics that can be used to differentiate them from other classes of saws, and that unique blade configurations used on reciprocating saws can be differentiated from each other.

Six saw blades were used in the study: five types of reciprocating saw blade with varying numbers of teeth-per-inch and one hacksaw blade for comparison with a common hand-powered saw. Partially fleshed hind and forelimbs of white-tailed deer (*Odocoileus virginianus*) were utilized as a proxy for human remains. A minimum of ten complete kerfs and two false-start kerfs were made using each saw blade on the remains. In addition, three partially fleshed cervical vertebrae segments of white-tailed deer were sawn a variable number of times by the reciprocating blades of the lowest and highest teeth-per-inch, as well as the hacksaw blade. Following sawing, the remains were further defleshed using scalpels, macerated, dried, and then placed in a dermestid colony to remove any residual soft tissue.

The remains were examined macroscopically and microscopically for a suite of class characteristics as denoted in Symes and Symes et al.[1,2] Features examined include: kerf floor shape, minimum kerf width, blade drift in kerf, cut surface drift, exit chipping, cut consistency, tooth imprint, entry flare, kerf flare, bone islands, entrance shaving, pull-out striae, energy transfer, harmonics, and striation regularity/visibility. The features were described qualitatively and/or scored as present/absent, with the exception of minimum kerf width, which was measured using digital calipers.

Qualitative analysis identified several key characteristics that varied based upon blade type and power source: size and location of exit chipping, cut surface drift, striation regularity/visibility, and energy transfer. Kerfs created by the hacksaw blade were readily differentiated from those made by the reciprocating saw blades. Hacksaw kerfs had minimal exit chipping and little cut surface drift, demonstrating a consistent blade path. The kerf walls were deeply etched, with readily visible striae that varied in regularity throughout the sawing event. The kerfs did not show any evidence of energy transfer (i.e., polishing of the cut surface).

The reciprocating saw kerfs varied based upon blade type but overall displayed lesser blade control and less visible kerf wall features. Kerfs showed relatively larger exit chipping and across a greater degree of the kerf edge. Chipping varied in size based on the Teeth Per Inch (TPI) of the blade but was found both externally and within the medullary cavity of the element. Interior exit chipping was not observed in the hacksawed bones. The reciprocating saw kerfs also displayed cut surface drift, as the path of the blade was not consistent. The striae were irregular and decreased in visibility with lower TPI blades. The kerf walls were highly polished, demonstrating extensive energy transfer.

In conclusion, while the degree of expression of these characteristics varied based upon blade, reciprocating blades can be confidently differentiated from hand saws. Furthermore, this research provides data regarding varied kerf characteristics for different reciprocating blades.

Reference(s):

1. Symes S.A. 1992. Morphology of Saw Marks in Human Bone: Identification of Class Characteristics. PhD dissertation. University of Tennessee.
2. Symes S.A, Chapman E.N., Rainwater C.W., Cabo L.L., Myster S.M.T. 2010. *Knife and Saw Toolmark Analysis in Bone: A Manual Designed for the Examination of Criminal Mutilation and Dismemberment.* Report, National Institute of Justice, Grant 2005-I-J-CX-K016.

Sharp Force, Trauma, Reciprocating Saws